

AD-A120 026

NAVAL OCEAN SYSTEMS CENTER SAN DIEGO CA
SHIPBOARD MEDICAL BACKPACK: PREPRODUCTION MODEL TEST AND EVALUA--ETC(U)
JUN 82 R W KATAOKA, F R BORKAT

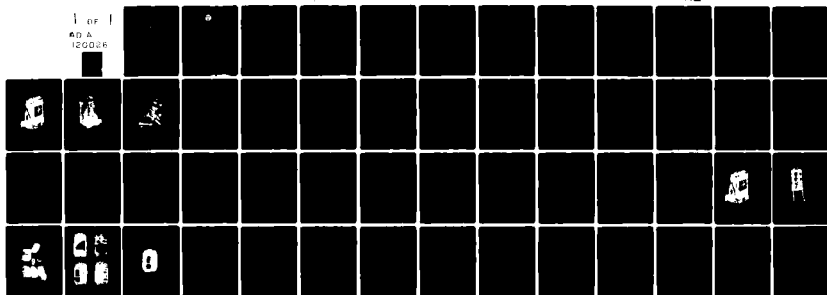
F/G 6/12

UNCLASSIFIED

NOSC/TR-737

NL

1 OF 1
AD A
120026



END
DATE
FILMED
11-88
DTIC

NOSC TR 737

AD A120026

NOSC TR 737

Technical Report 737

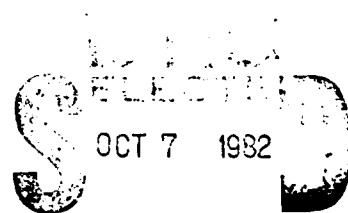
**SHIPBOARD MEDICAL BACKPACK:
PREPRODUCTION MODEL TEST
AND EVALUATION**

R. W. Kataoka
F. R. Borkat

June 1982

Final Report

Prepared for
Naval Medical Research and Development Command
Code 45



Approved for public release; distribution unlimited

A

DTIC FILE COPY

NOSC

NAVAL OCEAN SYSTEMS CENTER
San Diego, California 92152

82 10 07 002



NAVAL OCEAN SYSTEMS CENTER, SAN DIEGO, CA 92152

AN ACTIVITY OF THE NAVAL MATERIAL COMMAND

SL GUILLE, CAPT, USN

Commander

HL BLOOD

Technical Director

ADMINISTRATIVE INFORMATION

This Technical Report describes work performed under Program Element 64771N, Project M0933-PN (NOSC 512-FA40) between 1 October 1980 and 1 October 1981 for the Naval Medical Research and Development Command, Code 45. It is a summary of the test and evaluation of preproduction shipboard medical backpack units by the medical departments of 29 ships during a two-month period from June to August 1981. The data for this report were gathered using an evaluation questionnaire (see Appendix A). The principal investigator of this work is RW Kataoka (Code 5123) with the assistance of FR Borkat (Code 5123), under the direction of WT Rasmussen, Head, Bioengineering Branch (Code 5123).

Released by
JM Stallard, Head
Research Division

Under Authority of
HO Porter, Head
Biosciences Department

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER TR 737	2. GOVT ACCESSION NO. AD-A120026	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) SHIPBOARD MEDICAL BACKPACK: PREPRODUCTION MODEL TEST AND EVALUATION		5. TYPE OF REPORT & PERIOD COVERED Test and Evaluation 1 October 1980 - 1 October 1981
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) RW Kataoka, FR Borkat		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS Naval Ocean Systems Center San Diego, CA 92152		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 64771N, M0933-PN (NOSC 512-FA40)
11. CONTROLLING OFFICE NAME AND ADDRESS Naval Medical Research and Development Command Bethesda, MD 20014		12. REPORT DATE June 1982
		13. NUMBER OF PAGES 51
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Medical backpack ALICE (All Purpose Lightweight Carrying Equipment) frame Preproduction model		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The Biosciences Department of the Naval Ocean Systems Center was tasked by the Naval Medical Research and Development Command to develop and evaluate a backpack that would improve the method of carrying medical equipment to the site of an injury aboard ship. This report covers the preproduction model that was developed and tested on ships of different classes and the evaluations from the ships. It also details the number of backpacks that would be required by the fleet and the cost of these packs.		

DD FORM 1 JAN 73 1473

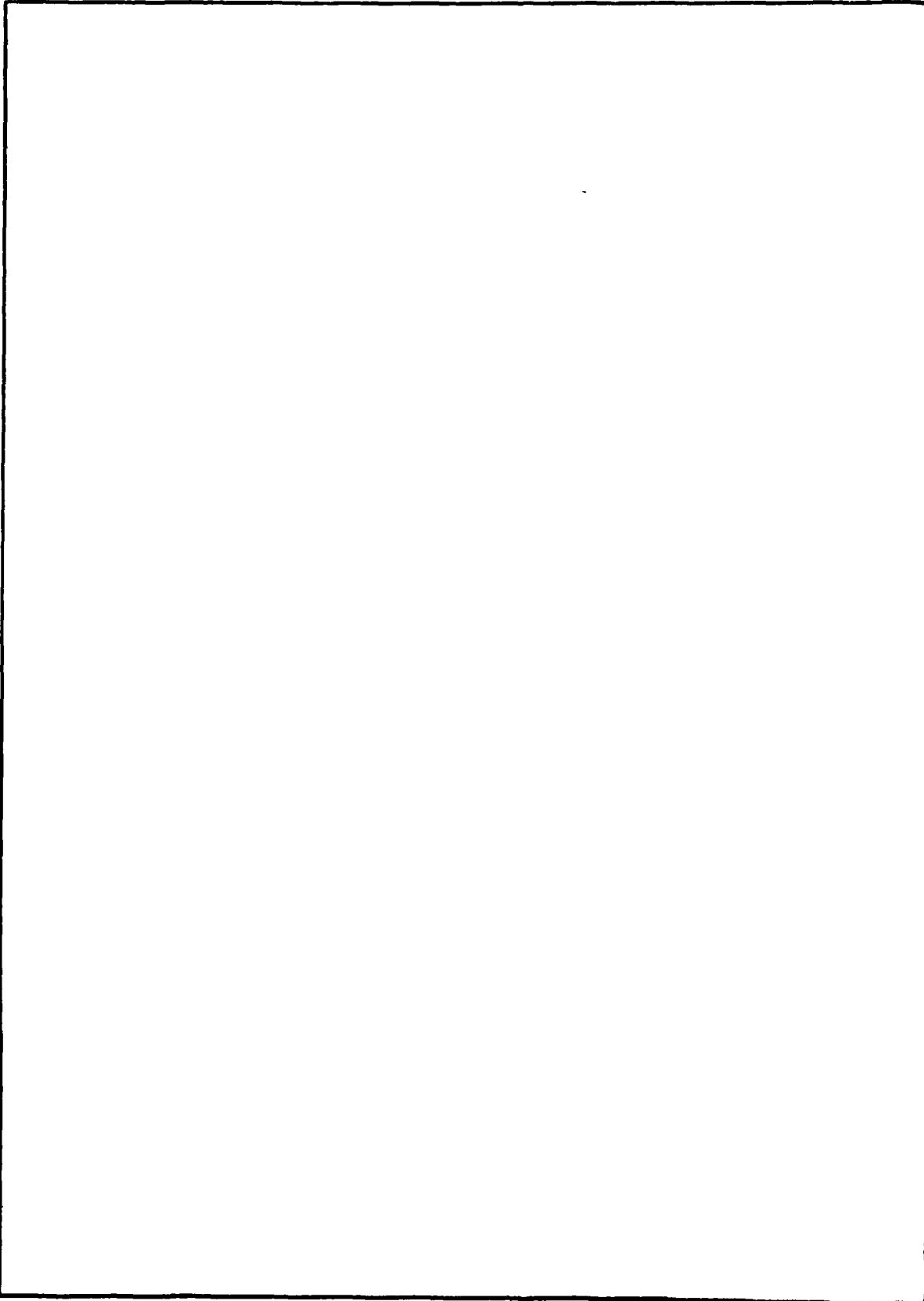
EDITION OF 1 NOV 65 IS OBSOLETE
S/N 0102-LF-014-6601

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)



S/N 0102- LF- 014- 6601

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE(When Data Entered)

ACKNOWLEDGMENTS

The following personnel and organizations contributed time and effort in providing information, guidance and assistance during the test and evaluation of the medical backpack: their participation is greatly appreciated. A special word of gratitude is given to the medical departments and evaluating corpsmen of the participating ships for their comprehensive evaluation of the medical backpacks.

NAVAL AIR FORCE
US Pacific Fleet

CAPT FE Dully, MC, USN
Force Medical Officer
LCDR CR Caldwell, MSC, USN
HMCS G Preuss

NAVAL SURFACE FORCE
US Pacific Fleet

CAPT DC Good, MC, USN,
Force Medical Officer
LCDR R Bolshazy, MSC, USN
HMCM Gulihur

NAVAL AIR FORCE
US Atlantic Fleet

CAPT DJ LeTourneau, MC, USN,
Force Medical Officer
HMCM R Johns
HMCM Richardson

NAVAL SURFACE FORCE
US Atlantic Fleet

CAPT Wm Phillips, MC, USN,
Force Medical Officer
HMCM Buchan

SERVICE GROUP ONE
Navy Supply Center
Oakland CA

HMCM G O'Keefe

MINE SQUADRON FIVE
Naval Support Facility
Seattle WA

HMCS H Justice

USS NIMITZ (CVN 68)

CAPT PC Bigler, MC, USNR
HM1 JL Waller
HM2 JE DeLutis
HM2 RA Glasgon

USS JOHN F. KENNEDY (CV 67)

HM3 JT Donlan Jr.

USS AMERICA (CV 66)

CW03 W Lussier, PA
HM3 J Polk
HM3 M Palmer

USS CONSTELLATION (CV 64)

CAPT WR Davis, MC, USN
LT SD Rodgers, MSC, USN
HM2 Duquette
HM3 Masanotti

USS FORRESTAL (CV 59)

CDR JB Noll, MC, USN
HM2 E Staly
HM3 JM Hathstad

USS CORAL SEA (CV 42)

LT DJ Heindel, MC, USN

USS MIDWAY (CV 41)

Accession For	
NTIS GRA&I	<input checked="" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By	
Distribution/	
Availability Codes	
Avail and/or	
Dist	Special
A	



USS LEXINGTON (AVT 16)	LCDR JF Graves, MC, USNR HM1 M Robinson
USS PELELIU (LHA 5)	LT J Applebaum, MC, USN HM1 D Rieb HM2 Hannon HM2 Browner
USS GUAM (LPH 9)	LT IG Knepp, MC, USNR HM1 EP Krauss HM2 ST Higgins HM3 D Esposito
USS BARBOUR COUNTY (LST 1195)	HMCS CD Roberts HM3 PA Bradley HMSN SR Bennett
USS NEWPORT (LST 1179)	HMCS MP Blanco HN Arroyo
USS YELLOWSTONE (AD 41)	HM1 W Thomas HM2 A Williams
USS WICHITA (AOR 1)	HMC G Maplethorpe HM1 S Taylor HM3 B Josey HM3 D Kohler
USS CONCORD (AFS 5)	LT MN Knowlan, MC, USNR HM1 RJ Fescenmeyer HM2 CD Watson HM2 PW Pidgeon HN Houser
USS FLINT (AE 32)	HMCS LG Smock HM1 CE Laroche HM3 DR Daniel
USS MISSISSIPPI (CGN 40)	HM1 MD Knapper HM3 JR VanCott
USS TRUXTUN (CGN 35)	HMC Willford
USS FOX (CG 33)	HMC R Mallon
USS STUMP (DD 978)	HM1 JM Sleeth HM3 B Mahl
USS MERRILL (DD 976)	HM1 PJ Owen, Head Med Dep HM2 TS Mihaltan
USS DONALD B BEARY (FF 1085)	HMC MD Milliken HM3 NS Bowers SN PA Garcia SN A Francis
USS SAMUEL ELIOT MORISON (FFG 13)	HMC MC Carr
USS IMPLICIT (MSO 455)	HM1 G Parkhouse

OBJECTIVE

The overall objective of this project was to develop and evaluate a backpack that would improve the method of carrying medical equipment to the site of an injury aboard ship. The specific objectives of the preproduction phase of testing were to:

1. Test and evaluate the preproduction model shipboard medical backpack on various classes and sizes of ships (CVN to MSO) to determine its operational effectiveness and operational suitability;
2. Determine the total number of backpacks required for fleet use and the cost impact of implementing the backpack,
3. Evaluate the instruction manual for the backpack.

RESULTS

This report is based on 24 questionnaires from the shipboard medical departments that received medical backpacks for evaluation. The participating medical departments represented 16 ship classes.

1. Most evaluators found the medical backpack operationally effective and suitable for their classes of ships. A summary of the results is given below:
 - a. Improved safety and mobility for corpsmen since the backpack allows hands-free transportation of medical equipment to the site of an injury.
 - b. Better ability to treat a wider range of injuries because more supplies can be carried to the injury site.
 - c. Good access to most parts of the ship was reported for most corpsmen wearing backpacks.
 - d. Rapid access to all contents of the backpacks.
2. The total number of medical backpacks required for fleet use is 600 units. The cost of implementing the backpacks is \$100,000.
3. The instructions and assembly manual for the medical backpack are adequate.

RECOMMENDATIONS

1. The medical backpack should be considered for inclusion into the authorized medical allowance list (AMAL) for ships.
2. The softpack should be developed as an accessory item for the standard All-Purpose Lightweight Carrying Equipment (ALICE) pack. A Federal Stock Number should be assigned to allow procurement by shipboard medical departments.

CONTENTS

1. INTRODUCTION . . . page 1
 - 1.1 Scope . . . 1
 - 1.2 Background . . . 1
 - 1.2.1 Concept . . . 1
 - 1.2.2 Prototype . . . 2
 - 1.2.3 Advanced Development Model . . . 2
 - 1.2.4 Preproduction Model . . . 3
2. MEDICAL BACKPACK DESCRIPTION . . . 4
3. TEST AND EVALUATION RESULTS . . . 8
 - 3.1 Method . . . 8
 - 3.2 Results . . . 8
 - 3.2.1 Evaluation of Medical Backpack Assembly and Operating Manual . . . 9
 - 3.2.2 Operational Effectiveness . . . 9
 - 3.2.3 Operational Suitability . . . 14
 - 3.2.4 Recommended Number of Backpacks . . . 16
 - 3.2.5 Evaluators' General Comments . . . 18
 - 3.3 Cost Impact . . . 21
 - 3.3.1 Estimated Number of Medical Backpacks for Fleet Use . . . 21
 - 3.3.2 Estimated Cost of Implementing . . . 22
4. SUMMARY AND RECOMMENDATIONS . . . 23
 - 4.1 Summary . . . 23
 - 4.2 Recommendations . . . 24
5. REFERENCES . . . 25

APPENDICES

- A. Evaluation Questionnaire: Shipboard Medical Backpack . . . A-1
- B. Ordering Information . . . B-1

ILLUSTRATIONS

- 1 Shipboard medical backpack, front view . . . 5
- 2 ALICE frame with shipboard medical backpack . . . 6
- 3 Shipboard medical backpack components . . . 7

TABLES

- 1 Evaluators' ship class, personnel and recommended number of backpacks . . . 17
- 2 Estimated number of backpacks for fleet use . . . 21
- 3 Estimated cost of medical backpacks for fleet use . . . 22

SECTION 1 INTRODUCTION

1.1 SCOPE

The purpose of this project was to develop a standard shipboard medical backpack to improve the method of transporting emergency medical supplies to the site of a shipboard injury. In this phase of the development, 50 preproduction model medical backpacks were fabricated, Engineering Level II drawings produced and a preliminary instruction manual drafted. This technical report summarizes data collected from the test and evaluation of the preproduction model backpacks and the instruction manual by the medical departments of several classes of ships.

The test and evaluation involved 29 ships selected by the Force Medical Officers of the Surface and Air Forces of the US Atlantic Fleet and the US Pacific Fleet. The test period was from two to three months, depending on when the ship received the units. The medical department of each ship received a medical backpack (each aircraft carrier received two backpacks), an instruction manual and a questionnaire (see Appendix A) that was to be completed at the end of the test period.

The remainder of this section describes the background of the medical backpack development. Section 2 describes the components, features and configurations of the medical backpack. Section 3 includes an analysis of the responses in the questionnaire, comments on these responses and a cost impact of implementing the backpacks. Section 4 includes suggestions for the disposition of the medical backpack.

Appendix A includes the questionnaire used for this evaluation. Appendix B includes federal stock numbers for the All-Purpose Lightweight Carrying Equipment (ALICE) frame and accessories, the tool punch used in this study and the NOSC drawing numbers for the softpack design.

1.2 BACKGROUND

1.2.1 Concept

During the shipboard test and evaluation of the Portable Life Support Stretcher Unit (PLSSU) by the Naval Ocean Systems Center (NOSC) under the sponsorship of the Naval Medical Research and Development Command (NMRDC), we observed that the usual method of transporting medical equipment and supplies from the ship's medical department to a shipboard casualty could be improved. Physicians and corpsmen responding to emergencies aboard ship may have one or both hands occupied with medical supplies while negotiating narrow passageways, ladders, hatches and catwalks. One solution considered was to mount the equipment and supplies to a backpack frame and allow free use of the hands. The concept for the medical backpack was discussed in July 1977 with CDR Etheridge, head surgeon aboard USS ENTERPRISE (CVN 65). NOSC developed a mockup unit and preliminary tests were conducted aboard USS KITTY HAWK (CV 63).

The concept of using a backpack for carrying medical equipment was not a unique NOSC observation. During a later visit to the USS EISENHOWER, it was found that a variety of backpacks were being used. NOSC then developed a prototype backpack that could be standardized for shipboard use.

1.2.2 Prototype

In October 1977, the Navy Science Assistance Program (NSAP) was requested by COMTHIRDFLT (Reference 1) to develop and evaluate the medi-vest unit (a flight deck life preserver modified with pockets to carry first aid supplies designed by HM2 L. Gann). COMTHIRDFLT also recommended that the NOSC backpack unit be evaluated and that an optimum design be selected. In March 1978, NOSC proposed to NSAP (Reference 2) to develop, test and evaluate the medi-vest unit and the NOSC backpack unit simultaneously, using similar test and evaluation plans. Evaluating personnel could use both packs together to determine their effectiveness in shipboard situations. NMRDC provided funds to fabricate seven backpacks. NSAP provided funds to fabricate 15 prototype medi-vest units and to test and evaluate both medical units.

NOSC prepared test and evaluation plans for each unit (Reference 3 and 4). COMTHIRDFLT assigned 11 ships for the sea evaluation. NOSC medical backpacks were tested aboard only the larger class ships (USS ENTERPRISE (CVN 65), USS NEW ORLEANS (LPH 11), USS LONG BEACH (CGN 9) and USS TRUXTUN (CGN 35)). A Search and Rescue (SAR) unit at the Marine Corps Air Station, Beaufort, South Carolina, also participated. The results of these combined tests and evaluations (Reference 5 and 6) showed both units were enthusiastically accepted and that they improved shipboard medical care in different situations. The medi-vest unit was highly recommended for flight deck use and other situations requiring a first aid kit. The medical backpack provided a means of transporting definitive medical equipment to the injury site with greater safety than the present hand-carrying method. These initial tests showed that the concept of backpacks carrying medical equipment and supplies onboard ship was useful but that design changes were required to make the backpack more functional.

1.2.3 Advanced Development Model

The purpose of the Advanced Development Model (ADM) was to determine a functional design for the medical backpack concept. Two styles of backpack were developed featuring easy access to the contents, compactness and usable carrying capacity. The two styles differed only in the type of frame that was used. After a test and evaluation by the medical departments of eight ships (Reference 7), the ADM backpack, incorporating the military All-Purpose Lightweight Carrying Equipment (ALICE) frame, was determined acceptable as a medical backpack for shipboard use.

¹ COMTHIRDFLT ltr 6700 ser 01T/1220, 5 October 1977.

² NOSC memo ser 823-M-40 WTR:mvh, 8 March 1978.

³ Test and Evaluation Plan for NOSC Medical Backpack, NSAP Project TH-1-78, RW Kataoka, NOSC TN 444, 17 May 1978.

⁴ Test and Evaluation Plan for Gann Medi-Pac Unit: NSAP Project TH-1-78, RW Kataoka, NOSC TN 445, 1 May 1978.

⁵ NOSC Medical Backpack Test and Evaluation Report, NSAP Project TH-1-78, RW Kataoka, NOSC TD 246, 1 March 1979.

⁶ Gann Medi-Pac Unit: NSAP Project TH-1-78, RW Kataoka, NOSC TR 370, 15 January 1979.

⁷ Shipboard Medical Backpack: Advanced Development Model Test and Evaluation Report, RW Kataoka, NOSC TR 663, August 1980.

Use of the pack with the ALICE frame has a number of advantages. The backpack frame and all the straps associated with the backpack are existing federal stock items. The medical backpack would become an accessory to the existing system. The ALICE packs have quick release shoulder and waist straps that are essential in emergency situations where the pack must be quickly freed from the carrier.

1.2.4 Preproduction Model

The preproduction phase incorporated modifications suggested by ADM testing, developed production drawings and an instruction manual.

SECTION 2

MEDICAL BACKPACK DESCRIPTION

The shipboard medical backpack unit is a combination of a new softpack design and the standard military All-Purpose Lightweight Carrying Equipment (ALICE) frame as shown in Figures 1, 2 and 3. The softpack is compatible with the ALICE frame and attaches to the frame in the same manner as existing Marine Corps softpacks. The shipboard model backpack unit includes design features that are necessary for emergency treatment and the shipboard environment that are not found in traditional backpacks. These design features include:

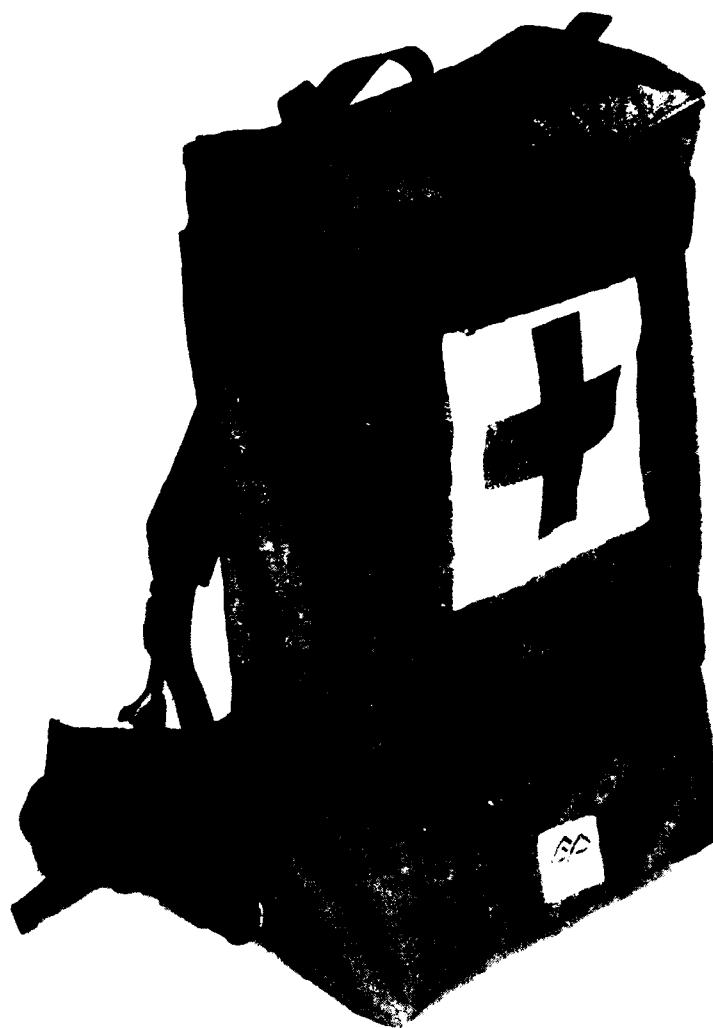
a. **Quick access to the contents.** The medical backpack has a Velcro top closure and zippers down each side that allow the front panel to be opened. This allows quick access to the entire contents of the backpack. The standard military packs, which are available for the ALICE frame, and other commercial packs are accessible only through the top. To reach something at the bottom, the entire contents would have to be removed.

b. **Compactness.** The medical backpack is designed to be compact to better negotiate the limited space of shipboard passages and scuttles. To make the backpack less bulky there are no exterior side or back pockets. Most commercial type backpacks have external pockets which, when fully loaded, make them too bulky to fit through shipboard passages and scuttles.

c. **Functional carrying capacity.** The medical backpack is designed to accommodate the standard shipboard emergency treatment equipment in various modular configurations.

d. **Emergency quick release.** The shoulder and waist straps of the medical backpack have quick release buckles that allow for the immediate removal of the backpack. This feature allows the corpsman to release the backpack from his shoulders without having to slide his arms out from the shoulder straps.

The medical backpack is 24 by 12 by 6 inches. It has two pockets on the interior of the front panel, a small pocket for a rope on the top of the pack, compression straps for securing the contents, carrying handles and interior straps for securing oxygen cylinders. The backpack will accept various combinations of standard medical equipment to be transported to a medical emergency, such as a D-size oxygen cylinder, Laerdal suction unit, Unit One medical kit or Life Pak 5 ECG monitor/defibrillator. Small pack modules and tool punches about the size of a Unit One (standard field medical kit), with zipper openings, were designed to hold small items within the pack. These modules could contain special treatment supplies for burns, cardiac arrest or trauma. Various combinations of equipment are shown in Appendix A.



FRONT
PANEL

Figure 1. Shipboard medical backpack, front view.

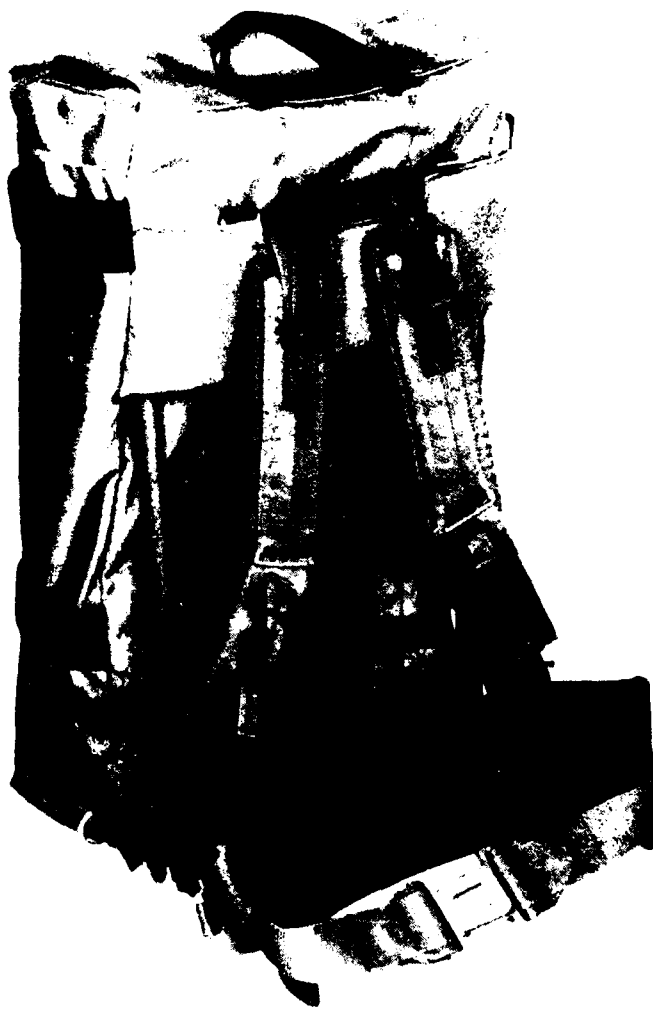


Figure 2. ALICE frame with shipboard medical backpack.

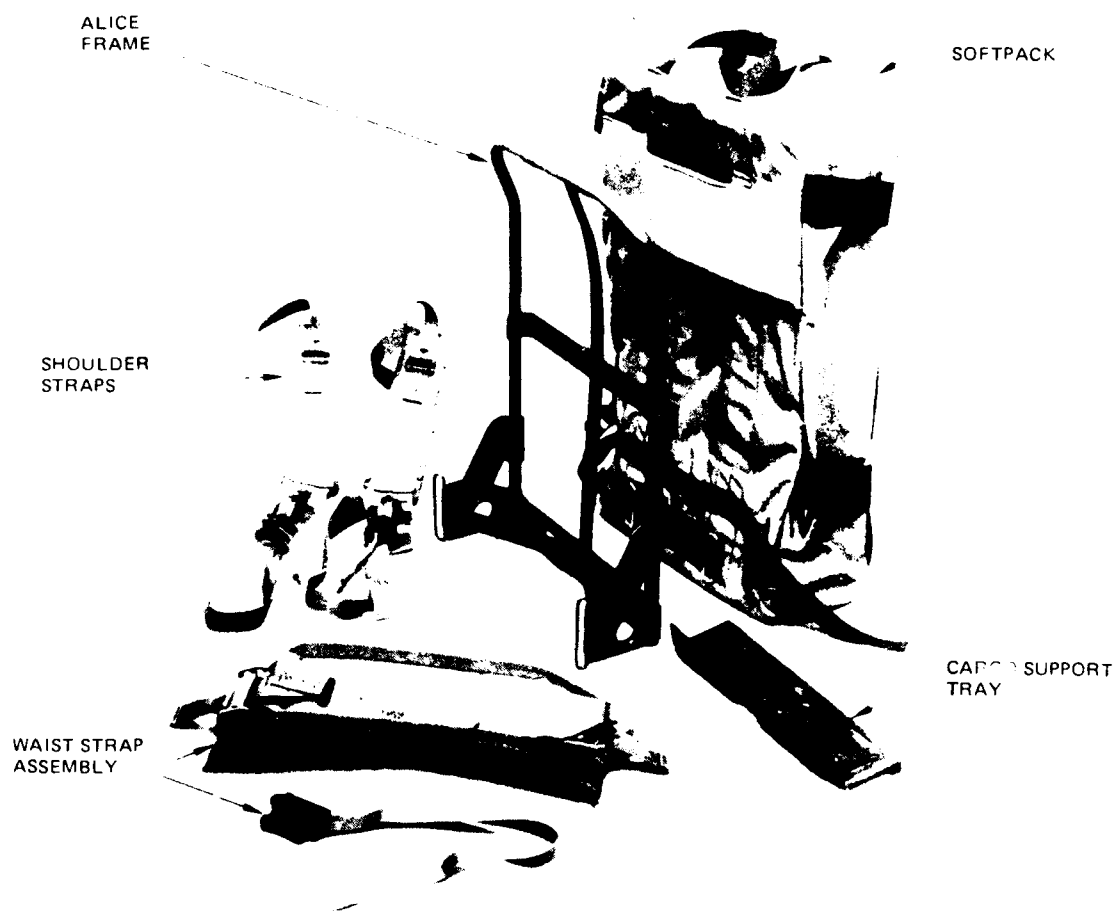


Figure 3. Shipboard medical backpack components.

SECTION 3 TEST AND EVALUATION RESULTS

The object of this phase of the evaluation was to test the backpacks aboard several classes of ships. The method of conducting the evaluation is described in Section 3.1. The summary of the questionnaire, Section 3.2, discusses comments on the instruction manual, analyzes the operational effectiveness and suitability, reviews the recommendations by evaluators for the number of backpacks for their classes of ships, and documents the general comments of the evaluators. Section 3.3 provides an estimation of the cost impact of supplying medical backpacks to the fleet.

3.1 METHOD

One objective of this evaluation was to determine which classes of ships would benefit from use of the medical backpack. To obtain fleet support, letters (Reference 8, 9, 10 and 11) were sent to the Force Medical Officers of COMNAVAIRPAC, COMNAVAIRLANT, COMNAVSURFPAC and COMNAVSURFLANT requesting assignment of various shipboard medical departments to evaluate the medical backpack. A minimum test period of two months was requested beginning in May and ending in August 1981. Shipboard medical personnel were briefed and given a demonstration of the backpack by NOSC personnel whenever possible. The other units were either distributed by the Force Medical Office or mailed. Each medical backpack included an instruction manual on assembly and operating the backpack and a questionnaire which they were asked to complete during the test phase and return after the test to NOSC.

During the ADM testing it was found that the medical departments of the aircraft carriers had an organized system for responding to shipboard injuries. A team of corpsmen and a set of medical equipment and supplies were assigned to respond to shipboard emergencies at the site of the injury. The concept is called the Medical Response Team (MRT). Since the medical backpack interfaced well with the MRT concept in the ADM phase, it was decided that two backpacks be assigned to each aircraft carrier so that they would receive an immediate benefit from the backpacks as well as provide valuable feedback. All other ships received one backpack.

3.2 RESULTS

Twenty-nine ships received medical backpacks, instruction manuals and questionnaires for the evaluation. Twenty-four questionnaires were received in time for the publication of this report. Twenty-two evaluators recommended the medical backpack for their classes of ships. The major advantage cited was that corpsmen could transport emergency medical equipment and supplies to the site of an emergency with their hands free.

⁸ COMNAVAIRPAC ltr 6780 ser 5123/6, 24 April 1981.

⁹ COMNAVAIRLANT ltr 6780 ser 5123/5, 24 April 1981.

¹⁰ COMNAVSURFPAC ltr 6780 ser 5123/7, 24 April 1981.

¹¹ COMNAVSURFLANT ltr 6780 ser 5123/8, 21 May 1981.

The results of the questionnaire are summarized in the following sections. Section 3.2.1 examines the evaluation of the instruction manual which accompanied each backpack. The results of the questions on operational effectiveness and suitability are summarized in Sections 3.2.2 and 3.2.3, respectively. Section 3.2.4 reviews the number of backpacks recommended for each class ship. The general comments of each evaluator are documented in Section 3.2.5.

3.2.1 Evaluation of Medical Backpack Assembly and Operating Manual

Each evaluator received a draft copy of "The Medical Backpack Assembly and Operating Manual." This manual describes how to assemble the ALICE frame, adjust the waist and shoulder straps, use the quick release features and operate the medical backpack and has descriptions of the internal configurations. This section summarizes the evaluators' answers to questions on the manual.

a. The instructions in the manual were reported to be adequate by all but one of the evaluators.

COMMENTS: None

b. The photographs were found adequate by all but three evaluators. Better reproduction of the photographs was recommended.

COMMENTS: The reproductions of photographs in the final version of the manual will be printed with much better quality.

c. All evaluators found the section headings on the manual to be adequate.

COMMENTS: None

d. The description of the assembly and operation of the medical backpack was reported adequate by all but one evaluator. A simpler version was requested for people not familiar with backpacks.

COMMENTS: The manual will be reviewed to assure completeness and simplicity.

e. Evaluators recommended inventory lists of equipment in the backpacks as other documentation for the backpack. Also recommended were cautions to the users about the using glass products within the backpacks and securing all straps before responding to emergencies.

COMMENTS: An inventory list should be made up by each medical department and included in each backpack. The cautions about glass and securing straps will be included in the manual.

3.2.2 Operational Effectiveness

This section summarizes the answers to questions on the operational effectiveness of the medical backpack. Twenty-four evaluators from various classes of ships provided responses to the questions.

a. The evaluators were asked to determine in which shipboard situations the medical backpack might be used. The questionnaire listed fire parties, flight deck, fueling, repairs, mass casualty, Medevac and trauma as examples. Most ships indicated they would use the backpacks in all the above situations with the exception of five evaluators who would not use it for mass casualty situations. Additional shipboard situations where backpacks were included by the evaluators were: man overboard, boarding vessels to render medical aid and battle dressing station replenishment during battle conditions.

COMMENTS: From the responses received, the medical backpack will be used in many of the shipboard situations that involve medical personnel. Since each medical department and ship environment is different, each ship should determine the situations where its backpack is to be used.

b. Ten evaluators used the backpacks in actual medical emergencies aboard ship and two evaluators used the backpacks in simulated emergencies without problems.

COMMENTS: Before using the backpack in an actual emergency, it is recommended that corpsmen be familiar with the features and contents, as well as access limitations while carrying the backpack. This familiarization will provide greater safety to corpsmen and more efficient treatment to patients.

c. Most evaluators would use one configuration of backpack for medical emergencies aboard ship. Some evaluators would have special backpacks for Medevac, flight deck, Life Pak 5 ECG monitor and defibrillator and cardiac arrest.

COMMENTS: Each medical department should determine the contents and configuration of the backpack for its situations.

d. The medical backpack can be used with or without the ALICE frame. In both cases the ALICE frame shoulder straps are used. Most evaluators preferred the backpack with frame.

COMMENTS: The ALICE frame provides better support for the contents of the backpack.

e. Most of the evaluators would not change the contents of the backpack in peace time or combat. Those that would change the contents would add more dressings and drugs during combat.

COMMENTS: In peace time aboard ship, the backpacks are used to transport medical supplies to the scene of an injury to treat only a few injuries. A combat situation would produce larger numbers of casualties where the casualties would be transported to the battle dressing station or medical department with little treatment at the site of injury. The backpack might not be used in this situation.

f. The evaluators carried a variety of medical equipment and supplies. Some of the common items were various dressings, IV solution, splints, Ambu bag, airways and blood pressure cuff. Seven evaluators carried oxygen and three indicated carrying Life Pak 5 ECG monitor/defibrillators.

COMMENTS: Contents of the backpack should be determined by the medical department.

g. Most evaluators indicated that the backpack allowed them to carry more equipment to the scene. Some of the extra items carried were minor surgical kit, crash bag with resuscitation drugs, control drugs and additional dressings.

COMMENTS: Besides carrying more equipment, some of the advantages cited were:

USS CONCORD (AFS 5) "All necessary equipment was in the backpack, saving trips back to sickbay and allowing both hands to be empty."

USS FORRESTAL (CVT 16) "No more equipment but was easier to access."

USS CONSTELLATION (CV 64) "Being able to cover a wider range of injuries."

USS YELLOWSTONE (AD 41) "Able to handle more than one casualty with immediate access to oxygen and IV therapy."

h. Most evaluators did not recommend configurations other than those in the instruction manual.

COMMENTS: USS NIMITZ (CV 68) "There are many good variations, each ship knows its most common types of injuries and each pack should be set up accordingly."

i. All evaluators preferred to not standardize the contents of the backpack.

COMMENTS: The comment of the USS GUAM (LPH 9) was typical: "The items in the backpack should be left to each individual unit using the backpack. The requirements that we have on the GUAM are different from those that would be experienced on board a carrier or destroyer."

j. The experience level recommended by the evaluators was HM3 ratings and above and those certified emergency medical technicians (EMTs).

COMMENTS: Contents of the backpack should match the skill level of those who will use the contents. USS MERRILL (DD 976) "Experience level would depend on the type of equipment carried in the backpack."

k. Additional items suggested to support the backpack were handling line for lowering, wall brackets, small box for medicines and Life Pak 5.

COMMENTS: No comment.

l. The only damage reported was not to the backpack but to some of the contents. USS CONSTELLATION (CV 64) reported glass containers of drugs were broken. Drugs are now being carried separately in a case.

COMMENTS: Care should be taken for any breakable items carried in the backpack. IV in plastic bags should be substituted for those in glass bottles. Glass ampules and vials should be protected with padding or in a hard case.

m. Five evaluators indicated that the plastic quick release waist belt buckle might be the only item to be damaged by use.

COMMENTS: The plastic quick release buckle is a new change for the ALICE frame. The organization responsible for the ALICE frame and straps will take action on the buckle if it does not hold up to wear and use.

n. Evaluators were asked to comment on the potential hazards of using the backpack.

EVALUATORS

USS LEXINGTON (CVT 16)

USS MIDWAY (CV 41)

USS CORAL SEA (CV 43)

USS FORRESTAL (CV 59)

USS CONSTELLATION (CV 64)

USS JOHN F. KENNEDY (CV 67)

USS AMERICA (CV 66)

USS NIMITZ (CV 68)

POTENTIAL HAZARDS

None

None

None

Yes. "Pulling quick release snap by mistake and it will fall off"

None

None

Yes. "If improper instruction in use of quick release is lacking, corpsmen tend to tape quick release closed to avoid accidental unsnapping. This presents drowning hazard if corpsmen fall overboard."

None

EVALUATORS

USS PELELIU (LHA 5)

USS GUAM (LPH 9)

USS NEWPORT (LST 1179)

USS BARBOUR COUNTY (LST 1195)

USS WICHITA (AOR 1)

USS YELLOWSTONE (AD 41)

USS CONCORD (AFS 5)

USS FLINT (MSO 455)

USS TRUXTON (CGN 35)

USS FOX (CG 33)

USS MISSISSIPPI (CGN 40)

USS SAMUEL E. MORISON (FFG 13)

USS DONALD B. BEARY (FF 1085)

USS MERRILL (DD 976)

USS STUMP (DD 978)

USS IMPLICIT (MSO 455)

POTENTIAL HAZARDS

Yes. "You need to cover the oxygen bottle, which is stated in your instructions."

None

None

Yes. "Would be easy to snag in some areas of the passageways."

Yes. "Getting stuck in small places."

None

Yes. "Care should be taken to prevent rupture of oxygen tank during transport."

None

Yes. "Too bulky for ladder wells."

None

None

Yes. "Going up ladders through scuttles potential catching pack and being pulled back."

Yes. "If hurrying up a ladder with the backpack on, top of pack is likely to catch on edge of scuttle and possibly cause loss of balance and a slip or fall. However, this could usually be avoided by increased awareness and caution."

None

None

None

COMMENTS: The potential hazards indicated by the evaluators can be avoided by training the corpsmen properly before they must use the backpack in an emergency. Pulling the quick release strap by mistake can be avoided by becoming familiar with adjusting the shoulder straps. With proper use the quick release shoulder strap can be an added safety factor to remove the backpack immediately. Perhaps a color coding of the straps would be helpful. If an oxygen cylinder is used in the backpack, the protective metal cap should be used as stated in the instruction manual. Small ships indicated more potential problems with access through limited spaces. Each corpsman should know his limitations with the backpack. Where there is restricted space a haul rope should be used.

o. Evaluators were asked if the backpack improved safety for corpsmen carrying equipment to the site of a medical emergency.

EVALUATORS

USS LEXINGTON (CVT 16)

USS MIDWAY (CV 41)

USS CORAL SEA (CV 43)

USS FORRESTAL (CV 59)

USS CONSTELLATION (CV 64)

IMPROVED SAFETY

Yes

Yes

Yes

Yes. "Equipment secure, weight distributed, making it easier to carry."

Yes

EVALUATORS

USS JOHN F. KENNEDY (CV 67)
USS AMERICA (CV 66)

USS NIMITZ (CV 68)

USS PELELIU (LHA 5)
USS GUAM (LPH 9)

USS BARBOUR COUNTY (LST 1195)

USS NEWPORT (LST 1179)

USS WICHITA (AOR 1)
USS YELLOWSTONE (AD 27)
USS CONCORD (AFS 5)

USS FLINT (AE 32)

USS TRUXTUN (CGN 35)
USS FOX (CG 33)

USS MISSISSIPPI (CGN 40)
USS SAMUEL E. MORISON (FFG 13)
USS DONALD B. BEARY (FF 1085)

USS MERRILL (DD 976)

USS STUMP (DD 978)

USS IMPLICIT (MSO 455)

IMPROVED SAFETY

Yes

Yes. "Leaving both hands free and no swinging medical bag, i.e., old Unit One configuration, improves safety."

Yes. "Very much so, the safety of free hands and the oxygen being secured is outstanding."

Yes. "Free hands for other purposes."

Yes. "Use of the pack leaves the corpsman's hands free to handle anything that comes up. It is also much more comfortable."

Yes. "Frees hands for use on ladders - ensures nothing hung off exterior of pack."

Yes. "Due to the main reason that your hand is free, going up and down hatches and ladder wells."

No

Yes. "Free use of hands."

Yes. "The corpsman instead of having both hands full have full use of both hands on ladders to prevent falling."

Yes. "Free hands to brace yourself when hurrying to an emergency."

No. "Cumbersome."

Yes. "Having one's hands free has a lot to say about safety."

Yes. "Hands free."

Yes. "Hands are free to hold ladder rails."

Yes. "Allows at least one hand free to pull up, brace, catch fall, etc. Also, allows transport of oxygen cylinder with mounted regulator, without danger of striking and shearing off valve assembly."

Yes. "Allows for more safety while climbing and descending ladders, especially in access trunk."

No. "More equipment carried, safety hazard going through escape hatch."

Yes

COMMENTS: Twenty-one of the 24 evaluators indicated that the backpack improved safety for corpsmen carrying medical equipment aboard ship. Fourteen evaluators cited having the free use of their hands as the reason for the improved safety.

3.2.3 Operational Suitability

This section summarizes the answers to questions on the operational suitability of the medical backpack. Twenty-four evaluators of various sizes of ships provided responses to the questions.

a. Evaluators noted that access through a 24-inch scuttle was a problem for physically larger corpsmen (about 72 inches, 180 pounds) wearing the backpack and did reduce the speed of access through the scuttle when in a hurry. Two corpsmen could not access the 24-inch scuttle (70 inches, 240 pounds and 69 inches, 190 pounds).

COMMENTS: Corpsmen assigned to use the backpack should know their own limitations regarding access through the smaller hatches and scuttles while wearing the backpack. Physically larger corpsmen will have access problems through smaller hatches whether hand-carrying or wearing the backpack. In both cases, the equipment will have to be lowered or lifted through the hatch separately. As expressed by one evaluator, USS PELELIU (LHA 5), "A 24-inch hatch in a hurry does show some problems, wearer must remember he has the pack on." The USS MIDWAY (CV 41) "I recommend the pack off to go through 24-inch hatches, quick release straps are good for this."

b. Lowering the backpack through an 18-inch scuttle was a problem for two of the evaluators. One evaluator documented that the backpack was too wide when loaded and the other had difficulty lowering and raising the backpack and suggested using a rope.

COMMENTS: An 18-inch scuttle is one of the smallest openings that a corpsman would be required to pass through. The backpack, although not worn by a corpsman, should be able to be lowered through an 18-inch scuttle using a rope. The pocket at the top of the backpack is suggested as a location for the rope. The evaluator who was having problems with the backpack being too wide might rearrange or eliminate some the equipment being carried so that the backpack will fit the 18-inch scuttle. Another backpack to split the load would also be a solution.

c. Kapok life preserver was the only item mentioned that could not be worn while wearing the backpack.

COMMENTS: Although the kapok type life preserver could not be worn, the USS TRUXTUN (CGN 35) used the backpack with an "inflatable type life preserver."

d. Two evaluators found the backpack interfered with a corpsman wearing a helmet.

COMMENTS: USS PELELIU (LHA 5) documented problems with head gear "depends on how you pack the backpack." Rearranging the contents on the backpack may eliminate the problems for these evaluators.

e. The backpack was compatible with other equipment carried by corpsmen.

COMMENTS: USS GUAM (LPH 9) noted that by using the backpack it "allowed corpsmen to carry other extra gear such as a stretcher."

f. Three problems with the quick release straps were noted by the evaluators. USS GUAM (LPH 9) "when adjusting the shoulder straps the snaps tend to come undone." USS FORRESTAL (CV 59) "pulling the wrong strap and it falls off," and USS NEWPORT (LST 1179) "the quick release waist strap is hard to release."

COMMENTS: The snaps of the quick release shoulder strap unsnap easily so as not to interfere with releasing the quick release buckle. The snaps should not be taped to hold them in place because this interferes with the quick release buckle in an emergency. Pulling on the wrong strap should not be a problem as the user becomes more familiar with the strap arrangement.

g. Almost all evaluators documented that backpack provided good access to the contents.

COMMENTS: USS SAMUEL E. MORISON (FFG 13) "good zipper access."

h. Most evaluators found a storage space for the backpacks in the medical departments. Aboard the minesweeper the backpack could not be stored in sickbay but had to be stored in the storage room. Some evaluators suggested a wall hook would be ideal for storing the backpacks and also provide ready use.

COMMENTS: The backpack is best stored in a place that provides easy access and allows the backpack to be put on quickly. USS CONSTELLATION (CV 64) "Hung from two hooks with straps facing out for each mounting."

i. It was reported almost unanimously that the backpack allowed the corpsmen's hands to be free and provided better mobility than hand carrying medical equipment.

COMMENTS: USS CONCORD (AFS 5) "The consensus of opinion is that the backpack makes transporting emergency equipment to the scene easier and leaves the hands free to carry other equipment that might be necessary (i.e., Stokes litter)." USS BARBOUR COUNTY (LST 1179) "Backpack eliminates hand carrying items and minimizes chances of injuries while responding." USS JOHN F. KENNEDY (CV 67) "Much more mobility to grasp with hand."

j. An overwhelming number of evaluators preferred the medical backpack with the ALICE frame than without it.

COMMENTS: The ALICE frame with the cargo tray provides support for the medical equipment. The frame also keeps the contents of the backpack away from the back for better cooling and comfort.

k. Only two evaluators thought the backpack should be green like the Unit Ones. The other evaluators were satisfied with the orange color provided.

COMMENTS: The medical backpack is intended for use on board ship and with other rescue units but not in the field with the marines and, therefore, the orange color is considered satisfactory.

l. Most evaluators felt that the olive drab tool pouches (FSN 5140-00-329-4306) were adequate as supply organizers within the backpack.

COMMENTS: The tool pouches will be recommended for use with the backpack. They will replace the pack modules that were designed for the backpack. The tool pouches are considerably cheaper in price.

m. The training required for the use of the backpack varied from no training to practicing with simulated emergencies.

COMMENTS: The training required to incorporate the backpack will not be extensive. It should include familiarization with features of the backpack, the corpsmen's limitations through spaces while carrying the backpack and contents of the backpack and how to use them. USS WICHITA (AOR 1) "Mainly the way it should be worn and the uses of different straps and zippers. All corpsmen who carry the backpack should be familiar with the components therein." USS YELLOWSTONE (AD 41) "Mockup drill situations."

3.2.4 Recommended Number of Backpacks

Evaluators were asked to estimate the number of backpacks that would be suitable for their class of ship. Table 1 shows each evaluator by ship type, ship class, complement (ship/other), medical personnel (physician/corpsmen) and the recommendation of each evaluator for the number of backpacks. From Table 1, we can see a correlation between the size of the ship's complement and medical staff and the number of backpack recommended by the evaluators. The larger the complement and medical staff, the greater the number of backpacks recommended. To estimate the number of backpacks required for the fleet, ranges of ship's complement and recommended numbers of backpacks can be grouped from Table 1.

The aircraft carriers by far have the largest complements (4500 to 6300, ship and air crews) and medical staffs (two to five physicians and 30 or more corpsmen). All eight evaluators aboard the aircraft carriers endorsed the use of the backpack and recommended from two to seven backpacks per ship or an average of almost four per ship. Several factors make the backpack well suited for aircraft carriers. The activity of launching aircraft and the large complement of people provide the potential of injuries. The enormous size of the ship means that long distances may have to be travelled from the medical department to the injury site. The medical backpack provides the Medical Response Teams an improved and safer method of transporting the medical equipment and supplies. USS NIMITZ (CVN 68) "Due to the size of the ship, the type of ship and wide age span, when responding to an emergency we must be prepared for an emergency; therefore, (with) the amount of supplies we carry we would need at least two packs for each team. We have two teams, so presently we have the pack and a medical box for each team."

The next grouping of ship classes are those with complements ranging from 1800 to 2800 people and with medical staffs of one physician and 11 to 19 corpsmen. Included in this group are the LHA, LPH and AD classes. All evaluators of this group endorsed the use of the backpacks for their classes of ships. The evaluators of this group have recommended two backpacks per ship.

The LST, AFS, AOR, AE, CGN and CG form the next group of ship classes with complements ranging from 400 to 600 people. The medical staffs of these ships may or may not have physicians. They have between two and four corpsmen assigned. An average of this group's recommendation is just under two backpacks per ship (1.75 backpacks). A figure of two backpacks per ship will be used for ships of this size. The evaluator from the AE class did not recommend the backpack for everyday peacetime situations such as flight quarters and CONREPS for their class or smaller size ships. The other seven evaluators of this ship group endorsed the backpack for their ships' use.

The DD, FF and FFG class ships have complements of 160 to 300 personnel with one or two corpsmen in the medical department. The recommendation for these ships varied from no backpacks to two backpacks or an average of one backpack per ship. One ship did not endorse the use of the backpack on this size ship.

The minesweeper class was the smallest size ship that evaluated the backpack. This class has a complement of 76 with one corpsman. The recommendation from this evaluator was that the backpack was not suitable for this size ship. The limited space of the medical department and the short distance to all parts of the ship are reasons for not using the backpack.

Evaluators	Ship Class	Complement ¹ , ship/other	Medical Personnel, phys/corps	Recommended Number of Backpacks
<u>AIRCRAFT CARRIERS^{2,5}</u>				
USS NIMITZ (CVN 68)	CVN	3300/3000	5/40	4
USS DWIGHT D. EISENHOWER (CVN 69) ³	CVN	3300/3000		
USS VINSON (CVN 70) ³	CVN	3300/3000		
USS KITTY HAWK (CV 63) ³	CV	2800/2150		
USS CONSTELLATION (CV 64)	CV	2800/2150	4/39	2
USS AMERICA (CV 66)	CV	2800/2150	5/39	4
USS JOHN F. KENNEDY CV 67)	CV	2800/2150	2/26	4
USS FORRESTAL (CV 59)	CV	2790/2150	4/32	6
USS RANGER (CV 61) ³	CV	2790/2150		
USS INDEPENDENCE (CV 62) ³	CV	2790/2150	5/32	
USS CORAL SEA (CV 43)	CV	2710/1800	5/39	7
USS MIDWAY (CV 41)	CV	2615/1900	5/30	2
USS LEXINGTON (CVT 16)	CVT	1400/	2/16	2-3
<u>AMPHIBIOUS WARFARE FORCE</u>				
USS PELELIU (LHA 5)	LHA	902/1903	1/16 ⁶	2-4
USS GUAM (LPH 9)	LPH	609/1731	1/11 ⁶	2
USS NEWPORT (LST 1179)	LST	196/431	0/2 ⁶	2
USS BARBOUR COUNTY (LST 1195)	LST	196/431	0/3 ⁶	2
<u>AUXILIARY SHIPS</u>				
USS YELLOWSTONE (AD 41)	AD	1803/0	1/19	2
USS CONCORD (AFS 5)	AFS	486/0	1/4	2
USS WICHITA (AOR 1)	AOR	390/0	1/3	2
USS FLINT (AE 32) ³	AE	411/0	0/3	1
<u>CRUISERS</u>				
USS TRUXTUN (CGN 35)	CGN	528/0	1/4	1
USS MISSISSIPPI (CGN 40) ⁴	CGN	472/0		
USS FOX (CG 33)	CG	418/0	0/2	2
<u>DESTROYER</u>				
USS STUMP (DD 978)	DD	296/0	0/2	0
USS MERRILL (DD 976)	DD	296/0	0/2	2
<u>FRIGATES</u>				
USS DONALD B. BEARY (FF 1085) ⁴	FF	245/0		
USS SAMUEL E. MORISON (FFG 13)	FFG	164/0	0/1	1
<u>MINE SWEEPER</u>				
USS IMPLICIT (MSO 455)	MSO	76/0	0/1	0

1. Jane's Fighting Ships, 1980-81.
2. USS ENTERPRISE was in dry dock during test period and did not participate.
3. Questionnaire received too late to be included in evaluation.
4. Did not answer this question because of misprint in questionnaire.
5. Includes air wing.
6. Does not include corpsmen or physician with Marine Corps.

Table 1. Evaluators' ship class, personnel and recommended number of backpacks.

To determine the number of backpacks for fleet use, the following estimates for backpacks will be used based on each ship's complement.

<u>Backpacks Recommended</u>	<u>Total Ship's Complement</u>
4	3500 or greater
2	400 to 3500
1	150 to 400

3.2.5 Evaluators' General Comments

This section documents the general comments of the medical departments evaluating the medical backpack. The comments are grouped by ship type.

AIRCRAFT CARRIERS

USS NIMITZ (CVN-68)

"This is one of the best safety (items) we have seen in a long time. Thanks."

USS JOHN F. KENNEDY (CV-67)

"The medical backpack is very useful on CV 67 due to its accessibility for the corpsmen carrying the pack. Large and more specialized equipment can be now carried to the site. Safety to the corpsman is more defined because he now has his hands (free) to grasp ladders, hatches and doors on board ship."

USS AMERICA (CV-66)

"Excellent addition to our medical equipment. A good replacement to the old Unit One medical kits."

USS CONSTELLATION (CV-64)

"The usage of the packs enables us to get to the scene of an injury faster and with more equipment for each specific injury. I believe they are a tremendous asset to a medical department which receives them."

USS FORRESTAL (CV-59)

"We found a big improvement in using the backpacks. Equipment more organized using pouches provided. Oxygen safer to carry (we averaged one broken gage a month the old way). We could use another four (besides the two received) so we could have two teams with three bags each to carry all we need. The black MD sealed bag continues to be a must because of people stealing drugs and syringes."

"More professional in appearance."

USS CORAL SEA (CV-42)

No comment.

USS MIDWAY (CV-41)

"The pack is good idea. We had a very crude backpack prior to these. These are a vast improvement."

USS LEXINGTON (AVT-16)

"Overall very pleased with lightweight yet sturdy construction of backpack and with carrying capacity."

AMPHIBIOUS WARFARE FORCES

USS PELELIU (LHA-5) (Amphibious Assault Ship)

"Backpack is a usable tool for corpsmen aboard our type vessel. Could be entered on AMAL to replace separate resuscitation and first aid bags used at present time."

USS GUAM (LPH-9) (Amphibious Assault Ship)

"Initial reaction to the backpack was negative due to the fact that it was something new. General opinion towards it improved as personnel tried it and found out that it is an improvement over the Unit Ones. The ease with which a great deal more and needed gear could be carried became an added factor towards acceptance of the unit. General opinion now is that the corpsmen feel much better about responding to actual emergencies using the units (backpacks) than if they carried the old Unit One."

USS BARBOUR COUNTY (LST-1195) (Tank Landing Ship)

"Backpack is relatively simple to utilize and employed properly can alleviate requirements to grab several different items and respond with 'both hands' full and still need more gear. Allows for safer movement of persons responding to a call."

USS NEWPORT (LST-1179) (Tank Landing Ship)

"The Medical Backpack is an essential piece of equipment for the Medical personnel aboard ship. I am positive it will get the same endorsement of other medical personnel aboardship."

AUXILIARY SHIPS

USS YELLOWSTONE (AD-41) (Destroyer Tender)

"The backpack gives more rapid response time and more adequate treatment on the scene by the corpsman responding."

USS CONCORD (AFS-5) (Combat Stores Ship)

"The medical department as a whole found the pack a great asset on board ship. It made going to fire drills and simulated and real emergencies much easier."

USS WICHITA (AOR-1) (Replenishment oiler)

"In general the backpack is a good idea but it must be made more balanced or uniformed for small corps personnel to carry, plus they should have O₂ available but "D" size is too large. The shoulder straps should be made wider or at a different angle so as not to cause loss of sensation to hands. Also the color should be uniform and green with a black cross instead of the present colors."

USS FLINT (AE-32) (Ammunition Ship)

"For everyday operations in peacetime, such as CONREPS or flight quarters, the pack became too much for any situation that this type (or smaller) ship would need. A type of vest with many pockets, such as a fly fisherman's vest, might be more useful."

CRUISERS

USS MISSISSIPPI (CGN-40) (Guided Missile Cruiser)

"Found to be most useful on evolutions requiring the ship's boat (man overboard helicopter detail) as it holds a portable suction unit andambu bag as well as Unit One. Blanket can be wrapped in a plastic bag and secured to the outside of the pack."

USS TRUXTUN (CGN-35) (Guided Missile Cruiser)

"I believe the backpack concept is a tremendous idea. Unfortunately like all innovative ideas too much has been added to make it a saleable item. In normal routine cardiac monitors and oxygen bottles are impractical."

USS FOX (CG-33) (Guided Missile Cruiser)

"A great piece of equipment. I feel that its been a long time in coming, but it is a shame that due to red tape we corpsinen in the fleet will never see it in general use."

DESTROYERS

USS STUMP (DD-978) (Destroyer)

"Backpack material -- should withstand shipboard life and test longer without falling apart at the seams. Color should be different plus backpack should be designed to go through escape hatches easier."

USS MERRILL (DD-976) (Destroyer)

No comment.

FRIGATES

USS SAMUEL ELIOT MORISON (FFG-13) (Guided Missile Frigate)

"Overall, I was pleased with the backpack with a few exceptions. I found it very difficult and at times impossible to go through a scuttle in GQ situations. I don't recommend oxygen be carried at all due to the danger of a possible explosion and the unnecessary weight. A manual resuscitator is sufficient until the patient can be transported to sick bay. I am very fortunate to be on a new ship where safety hazards are at a minimum and safety training is enforced."

USS DONALD B. BEARY (FF-1085) (Guided Missile Frigate)

"All in all, we are very pleased with performance and adaptability of this backpack, to the extent that we would like to see it become a required item aboard all fleet ships, or at least readily available for optional purchase through the Navy Supply System."

MINESWEEPER

USS IMPLICIT (MSO-455) (Ocean Minesweeper)

"I feel this backpack would be great for flight deck HMs, amphibious or field HMs with USMC. The only evolution on an MSO that this would come in handy would be abandon ship to have some extra medical gear. I would recommend the Gann Medical vest over the medical backpack (for MSO class)."

3.3 COST IMPACT

3.3.1 Estimated Number of Medical Backpacks for Fleet Use

The recommendations of the evaluators were used to determine the number of backpacks required per ship as a function of the size of the ship's complement. These data were also used to determine the number required for ship classes that did not participate in the evaluation. Table 2 shows the classes of ships, the active and building totals for each class of ship, the backpacks per ship and the total for each class. From Table 2 the total number of backpacks is almost 600. For this report, 600 medical backpacks will be used as the estimated number of units required for fleet use.

Category -- Type	Complement (Combined)	Ships Active & Building Total	Backpacks	
			Per Ship	Total
<u>Aircraft Carriers</u>				
CNV Aircraft Carriers (nuclear)	6300	4	4	16
CV Aircraft Carriers	4500-4900	10	4	40
<u>Cruisers</u>				
CGN Guided Missile Cruiser (nuclear powered)	470-1160	9	2	18
CG Guided Missile Cruiser	413-418	19	2	38
<u>Destroyers</u>				
DDG Guided Missile Destroyer	337-377	41	1	41
DD Destroyer	282-307	64	1	64
<u>Frigates</u>				
FFG Guided Missile Frigate	164-248	40	1	40
FF Frigate	196-248	59	1	59
<u>Amphibious Warfare Forces</u>				
LCC Amphibious Command Ship	1420	2	2	4
LHA Amphibious Assault Ship (GP)	2805	5	2	10
LKA Amphibious Cargo Ship	560	5	2	10
LPD Amphibious Transport Dock	1403	14	2	28
LPH Amphibious Assault Ship (helicopter)	2340	7	2	14
LSD Dock Landing Ship	740-773	13	2	26
LST Tank Landing Ship	672-822	20	2	40
<u>Auxiliary Ships</u>				
AD Destroyer Tender	825-1803	13	2	26
AE Ammunition Ship	386-411	13	2	26
AF Stores Ship	350	1	1	1
AFS Combat Stores Ship	486	7	2	14
AO Oiler	135-317	15	1	15
AOE Fast Combat Support Ships	600-800	4	2	8
AOR Replenishment Oiler	390-457	7	1	7
AR Repair Ship	1003-1330	4	2	8
AS Submarine Tender	1158-2568	13	2	26
AVM Guided Missile Ship	750	1	2	2
TOTAL				581

Table 2. Estimated number of backpacks for fleet use.

3.3.2 Estimated Cost of Implementing

The contractor of the preproduction model backpack estimates a current unit price of \$130 for an order of 600 softpacks. Table 3 shows the cost for the components of the medical backpack and the total implementation cost. The total cost of fleet implementation is under \$100,000.

	<u>Unit Cost</u>	<u>Number Required</u>	<u>Price</u>
ALICE frame and straps	\$ 22	600	\$13,200.
Softpack	130	600	78,000.
Tool Pouch (two per pack)	7	1200	8,400.
		TOTAL	\$99,600.

Table 3. Estimated cost of medical backpacks for fleet use.

SECTION 4

SUMMARY AND RECOMMENDATIONS

4.1 SUMMARY

Shipboard corpsmen and medical personnel are routinely called upon to treat casualties at the site of injury, which requires the moving of bulky definitive care medical equipment and supplies through the restricted spaces (e.g., scuttles, hatches and ladders) of the ship. The need for speed in assessing and treating injuries in certain situations highlights the short-comings of the current method of hand carrying equipment and supplies.

The shipboard medical backpack was developed to improve the method of transporting medical supplies to the site of a shipboard casualty. The backpack is a combination of a new softpack design and the standard military All-Purpose Lightweight Carrying Equipment (ALICE) frame. The softpack is completely compatible with the ALICE frame and attaches in the same manner as existing Marine Corps field packs. The design features of the backpack include:

- Quick access to the entire contents of the pack
- Compactness
- Functional carrying capacity for standard medical equipment and supplies
- Emergency quick release shoulder and waist straps

This report is based on 24 questionnaires from shipboard medical departments that received medical backpacks for evaluation. The participating medical departments represented CVN, CV, CVT, LHA, LPH, LST, AD, AOR, AFS, AE, CGN, CG, DD, FF, FFG and MSO class ships. Based on the evaluations by the shipboard medical departments, the backpack meets the goals of improving the method of transporting medical supplies to an injury site. Twenty-two of the 24 evaluators endorsed the backpack as an improvement to medical care aboard ship and recommended one or more backpacks for their class ship. The results of the evaluation include:

- Better safety and mobility to corpsmen responding to emergencies.
- Better organization and access to medical supplies.
- Better ability to treat a wider range of injuries because more supplies can be carried to the injury site.
- Good access to most parts of the ship while wearing the backpack.
- Compatibility with clothing worn by corpsmen.
- Adequate storage for the units.
- Minimal training required.
- Decisions on the contents of the backpack and the shipboard use of the backpack should be left up to the ship's medical department.

From the evaluator's recommendations, the estimated number of backpacks for each class ship was determined by the size of the ship's complement. The recommended number of shipboard medical backpacks per class ship is listed below:

Carrier classes (CV and CVN)	4
Amphibious warfare classes	2
Cruiser classes (CG and CGN)	2

Escort classes (DD, DDG, FF, FFG)	1
Auxiliary classes (except AF and AOR)	2
AF and AOR classes	1

The time required to implement the backpack into the Fleet should be relatively short because:

- Some of the medical backpack components are already available as standard federal stock items: (ALICE frame with accessories and tool pouches) only the soft pack will have to be fabricated.
- Manufacturing drawings (Engineering Level II) have been completed for the softpack.
- An instruction manual has been prepared and was reviewed during the shipboard evaluation without requiring major changes.
- Training required to implement the backpacks once aboard ship will be minimal and consist of becoming familiar with the features and the contents of the backpack.

The total number of shipboard medical backpacks required for Fleet use is 600. The total cost of these units is estimated to be \$100,000.

4.2 RECOMMENDATIONS

The shipboard medical backpack should be considered for inclusion in the authorized medical allowance list (AMAL) for ships. It is also recommended that a federal stock number be assigned to the softpack and that it be included as an accessory item for the standard military All-Purpose Lightweight Carrying Equipment (ALICE) frame.

SECTION 5 REFERENCES

1. COMTHIRDFLT ltr 6700 Ser 01T/1220, 5 October 1977.
2. NOSC memo ser 823-M-40 WTR:mvh, 8 March 1978.
3. Test and Evaluation Plan for NOSC Medical Backpack, NSAP Project TH-1-78, RW Kataoka, NOSC TN 444, 17 May 1978.
4. Test and Evaluation Plan for Gann Medi-Pac Unit: NSAP Project TH-1-78, RW Kataoka, NOSC TN 445, 1 May 1978.
5. NOSC Medical Backpack Test and Evaluation Report, NSAP Project TH-1-78, RW Kataoka, NOSC TD 246, 1 March 1979.
6. Gann Medi-Pac Unit: NSAP Project TH-1-78, RW Kataoka, NOSC TR 370, 15 January 1979.
7. Shipboard Medical Backpack: Advanced Development Model Test and Evaluation Report, RW Kataoka, NOSC TR 663, August 1980.
8. COMNAVAIRPAC ltr 6780 ser 5123/6, 24 April 1981.
9. COMNAVAIRLANT ltr 6780 ser 5123/5, 24 April 1981.
10. COMNAVSURFPAC ltr 6780 ser 5123/7, 24 April 1981.
11. COMNAVSURFLANT ltr 6780 ser 5123/8, 21 May 1981.

APPENDIX A
EVALUATION QUESTIONNAIRE
SHIPBOARD MEDICAL BACKPACK

SECTION 1 INTRODUCTION

Developed for:
Naval Medical Research and Development Command
National Naval Medical Center
Bethesda, MD 20014

Point of Contact

Richard W. Kataoka
or
Dr. Franklin Borkat
Bioengineering Branch
Code 5123
Naval Ocean Systems Center
San Diego, CA 92152

Autovon 933-6542 or 933-6471
Commercial 714/225-6542 or 714/225-6471

101. PURPOSE

The purpose of this questionnaire is to gather data to assess the operational suitability and operational effectiveness of a medical backpack for use on various classes of ships. Results from this questionnaire will help determine the readiness of the medical backpack for full-scale development and general use throughout the Navy.

102. EQUIPMENT DESCRIPTION

The medical backpack concept allows a corpsman to carry medical equipment and supplies to an injury site and have both hands free to negotiate ladders and passageways. The medical backpack supplied with this test and evaluation questionnaire consists of a standard All-Purpose Lightweight Individual Carrying Equipment (ALICE) frame and a waterproof canvas type pack. The ALICE frame is a standard military backpack frame with quick release shoulder and waist straps. It is available through the Federal supply system. When the situation is appropriate, the medical backpack can also be used without the frame. In this case, the medical backpack still uses the shoulder and waist straps with the quick release features. Detailed assembly and operating instructions are described in a separate document. (The Medical Backpack — Assembly and Operating Instructions.)

The medical canvas type pack is shown in Figures (A)1 and (A)2. It features the following: a carrying handle (A); top pocket for a hauling rope (B); load compression straps (C); internal straps to secure oxygen cylinders (D); two zippers for rapid access to the pack (E); large pocket within the back flap (F).

The medical backpack was designed to carry a variety of equipment depending on the anticipated type of emergency, situation to be encountered and the shipboard environment. For example, equipment that can be placed within the medical pack is the following: (Figure (A)3).

- ECG Defibrillator/Monitor
- Oxygen Cylinder (D size, one or two cylinders)
- Battery-powered suction unit
- Manual resuscitator
- Unit One medical kit
- Tool pouch with special supplies
- Medical Pack module(s)

Possible configurations of storage within the medical backpack are shown in Figures (A)4 through (A)8.

103. INSTRUCTIONS TO THE MEDICAL DEPARTMENT

1. One or more corpsmen should be designated to assemble, maintain, test and evaluate the medical backpack.
2. Assemble the medical backpack both with and without the ALICE frame as instructed by The Medical Backpack-Assembly and Operating Instructions.
3. Establish a protocol for use of the backpack in your Medical Department, i.e., in what medical situations would the backpack be used, and who would use it.
4. Load the backpack with equipment and supplies that may be required for emergencies on your ship. Develop any specialized modules that may be required for anticipated emergencies as required.
5. Practice responding to the situations in which the backpack would be needed. Also, perform the following tests if not included in the practice emergency:
 - a. Run through passageways, up ladders and climb through hatches.
 - b. Lower the backpack through an 18-inch hatch using a haul rope.
 - c. Put the backpack on over cold weather clothing, an inflatable vest or any clothing which may be used for an outside rescue.
 - d. Put on the backpack while wearing a safety helmet, communications equipment or any head wear that might be used.
 - e. Practice using the quick release shoulder and waist straps.
 - f. Practice opening the backpack to access the medical equipment inside.

Fill out the answers to Section 203. OPERATIONAL SUITABILITY.

6. Respond to all emergency situations appropriate for the backpack as previously determined with considerations for SAFETY described in Section 104.
7. During the test period, document all responses to injuries, problems, failures and corrective actions in the MEDICAL BACKPACK LOG of Section 301.
8. At the end of the test period complete all questions and tests on OPERATIONAL EFFECTIVENESS of Section 204.
9. Return the questionnaire in the envelope provided.
10. Inform NOSC of any conditions which may affect the completion of the test and evaluation.

ATTN: Richard W. Kataoka or Franklin Borkat
Code 5123
Bioengineering Branch
Naval Ocean Systems Center
San Diego, CA 92152

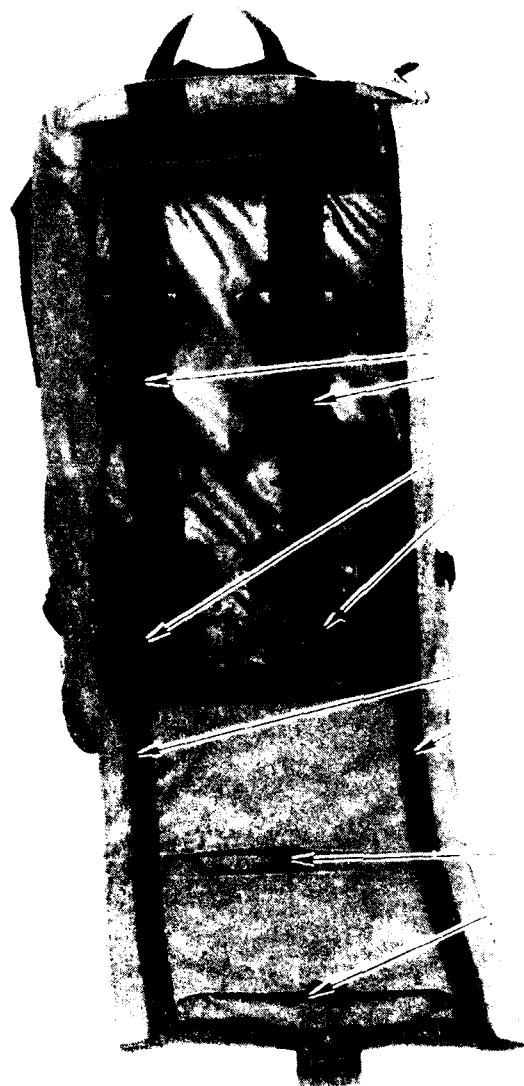
Telephone: AUTOVON 933-6542 or 933-6471
COMMERCIAL 714/225-6542 or 714/225-6471

104. SAFETY

In the conduct of all operations associated with this project, SAFETY is PARAMOUNT. Do not conduct any operation which, in the opinion of the Commanding Officer or the Head of the Medical Department, will endanger personnel or equipment. In the event an unsafe situation should develop, NOSC should be notified immediately of the situation and of the caution taken. Any recommendations for further action should also be forwarded to NOSC.



Figure (A)1. Medical backpack.



INTERNAL
STRAPS (D)

ZIPPERS (E)

BACK FLAP
POCKETS (F)

Figure (A12). Medical backpack, internal view.



Figure (A)3. Equipment that can be placed inside backpack.

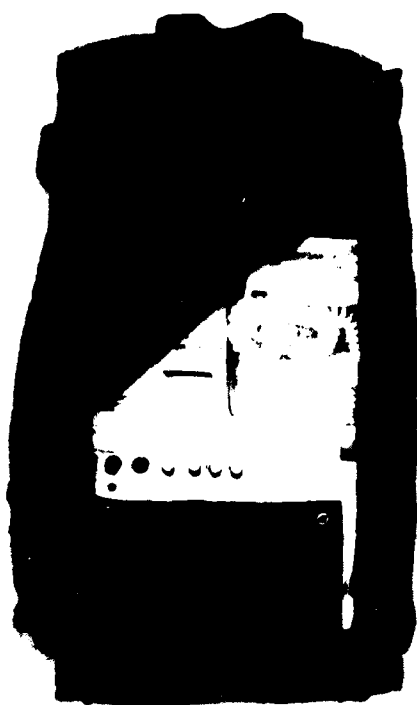


Figure (A)4. Medical pack module and ECG defibrillator/monitor.



Figure (A)5. Two medical pack modules and a defibrillator/monitor.



Figure (A)6. Two medical pack modules and one D cylinder bottle.



Figure (A)7. Three medical pack modules and a Unit One medical kit.



CAUTION TRANSPORT OXYGEN CYLINDERS
WITH PROTECTIVE METAL CAPS.

Figure (A)8. Resuscitator, Unit One medical kit and
a D size oxygen cylinder.

SECTION 2
QUESTIONNAIRE

Questionnaire Completed by:

Name and Rank

Head of Medical Department

Evaluating Corpsman

Evaluating Corpsman

Evaluating Corpsman

Date: _____

Ship Name: _____

Ship Class: _____

201. TECHNICAL DOCUMENTATION

1. Is the Medical Backpack-Assembly and Operating Instructions adequate to use the backpack? If No, Explain.

Yes _____ No _____

2. Are the pictures in the manual adequate to assemble the medical backpack? If No, Explain.

Yes _____ No _____

3. Are Section headings within the manual easy to identify? If No, Explain.

Yes _____ No _____

4. Are descriptions of the assembly and operation clear? If No, Explain.

Yes _____ No _____

5. Please identify any parts of the manual that need improvement and how the improvement could be made.

6. Is any other documentation needed for the backpack?

202. TRAINING

1. Do you recommend specific training for corpsmen in the use of the backpack, and, if so, describe what would be needed?

203. OPERATIONAL SUITABILITY

1. Give the height and weight of the corpsmen who tested the backpack. Does the backpack allow the wearer access through 24-inch hatches, up ladders, and through passageways? Describe problems.

Height	Weight	Access		Problems (if no access)
		Yes	No	
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

2. Can the backpack be easily raised or lowered through an 18-inch hatch between decks if necessary? Identify any problems.

Yes _____ No _____

3. Does the backpack allow other clothing (such as jackets, raincoats or inflatable vests) to be worn while carrying the backpack? Identify any difficulties.

Yes _____ No _____

4. Does the backpack obstruct or hamper a corpsman wearing a steel helmet, communications equipment or any other head wear when climbing a vertical ladder or in other situations? Identify the condition.

Yes _____ No _____

5. Is the backpack compatible with any other equipment that might be used by the corpsman? Identify any problems.

Yes _____ No _____

6. Were any problems encountered when using the quick release shoulder and waist straps? Identify the problems.

Yes _____ No _____

7. Are the contents of the backpack easily accessible? Identify the problems.

Yes _____ No _____

8. Is there adequate storage for the backpack in the medical department? Indicate how you store the backpack (in the corner, on the floor, in a locker, hanging from a special hook on the wall, etc?)

Yes _____ No _____

9. How does the mobility of a corpsman wearing the backpack compare to that of a corpsman carrying the equipment in his hand?

10. Is the unit comfortable to wear (weight and balance)?

Using ALICE frame? Yes _____ No _____

Without ALICE frame? Yes _____ No _____

11. Does the backpack fit corpsmen of various sizes in your department or would sized backpacks be required?

Yes _____ No _____

12. Are the color and markings of the backpack compatible with your ship requirements? Identify any problems.

Yes _____ No _____

13. Should an oxygen cylinder carrying case be included with each backpack?

Yes _____ No _____

14. Is the olive drab tool pouch adequate for carrying supplies in the backpack?

Yes _____ No _____

204. OPERATIONAL EFFECTIVENESS

1. How many medical personnel are assigned to your ship?

Physicians _____

Corpsmen _____

HMC _____

HM1 _____

HM2 _____

HM3 _____

HM and below _____

2. How many times was the backpack used for an emergency? _____

3. Is the medical backpack effective to transport emergency equipment to an injury site during the following situations:

<u>Situation</u>	<u>Yes</u>	<u>No</u>
Fire parties	_____	_____
Flight deck	_____	_____
Fueling	_____	_____
Repair parties	_____	_____
Mass casualties	_____	_____
MEDEVAC	_____	_____
Trauma calls	_____	_____

4. For the above situations is one configuration of backpack adequate for all emergencies?

Yes _____ No _____

If no, identify which situations should have special backpacks.

5. Did you prefer the Medical backpack with or without the ALICE frame?

6. Would there be any changes in the requirements for a medical backpack or its contents for peacetime versus combat situations?

Yes _____ No _____

If yes, explain _____

7. Indicate the contents of the medical backpack your department used during the test period (General description).

8. Were you able to carry more equipment to an emergency using the backpack than before?

Yes _____ No _____ If yes, was this useful? Explain. _____

9. Other than the configurations of backpack shown in Figures (A)4 through (A)8, what other configurations would your department recommend?

10. Should the contents of the medical backpack be standardized or left to be organized by each medical department?

11. Indicate the experience level you would recommend for corpsmen assigned to use the medical backpack and its contents.

12. What additional items would be required to support the medical backpack if it were used by your department?

13. Was there any damage done to the backpack or to the internal equipment due to use of the backpack during the evaluation?

Yes _____ No _____ If yes, what was the nature of the damage.

14. Is there any part of the backpack (buckles, zippers, materials, etc) that you feel will not withstand normal shipboard use?

15. Are there any potential hazards caused by use of the medical backpack?

Yes _____ No _____ If yes, explain. _____

16. Does the backpack provide an improvement in the safety of a corpsman while carrying equipment to an emergency?

Yes _____ No _____ Explain. _____

17. How many Medical Backpacks Would You Recommend for your Class Ship?

18. What Other Class Ships Would You Recommend Receive Medical Backpacks?

205. OVERVIEW

1. General Comments

2. Note any design changes you would like to see incorporated into the medical backpack. (These can be indicated on Figures (A)1, (A)2 or (A)3.)

SECTION 3
MEDICAL BACKPACK LOG

Fill in the appropriate columns of the log after each actual medical emergency in which the medical backpack was used. Also document any problems encountered using the medical backpack.

301. MEDICAL BACKPACK LOG

[illegible]

APPENDIX B
ORDERING INFORMATION

<u>Description</u>	<u>FSN</u>
1. Frame Pack, Ground Troop, with straps* (All-Purpose Lightweight Carrying Equipment, (ALICE))	8465 01 073 8326
2. Cargo Support Tray	8465 00 001 6476
3. Medical Pack (not yet a federal stock item)	
4. Tool Pouch, (6" x 6" x 12")	5140 00 329 4306
5. Strap, shoulder left hand, LC-2	8465 00 269 0482
6. Strap, shoulder right hand, LC-2	8465 01 078 9282
7. Strap, waist with lower back pad, pack frame LC-2	8465 01 075 8164
8. Field Pack, Nylon, Medium (standard Marine Corps issue)	8465 00 001 6480
9. Field Pack, Nylon, Large (standard Marine Corps issue)	8465 00 001 6481

*Ordering 8465 01 073 8326 includes all straps (items 5, 6, and 7).

This basic shipboard Medical Backpack consists of the ALICE frame (item 1), Cargo Support Tray (item 2) and the Medical Pack (item 3); the Medical Pack not yet in the federal stock system; the Tool Pouch (item 4) and can be used to modularize the backpacks' contents and should be purchased as needed. Items 5 thru 7 are individual straps that can be purchased separately. These (items 5, 6 and 7) are included with the ALICE frame when item 1 is ordered. Items 8 and 9 are the standard Marine Corps field packs that are also compatible with the ALICE frame (item 1).

**DAT
FILM**